EFFECT OF FERTILISERS ON PRODUCTION IN PERENNIAL RYEGRASS (*LOLIUM PERENNE* L.)

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Abstract

The paper points out the effect of some types of chemical fertilisers: conventional (complex) chemical fertilisers, foliar fertilisers, and controlled-release filmed fertilises. Results of fertilisers applied on Lolium perenne L. in vegetation plate experiments distinguish controlled-release filmed fertilisers that have a longer duration of action during vegetation.

Keywords: types of chemical fertilisers, perennial ryegrass (*Lolium perenne* L.), green matter, dry matter

INTRODUCTION

Conventional fertilisation based on the application of fertilisers at root level and on foliar fertilisation is two of the chemical fertilisation types used in agriculture, including perennial fodder species. Foliar feeding of plants with nutrients is efficient: it can increase production with 10-30% more than conventional fertilisation and depends on several factors such as morphological features of the foliar apparatus, atmospheric conditions during application, and duration of absorption of nutrients.

The paper points out the different effect of some types of fertilisers (conventional, filmed, and foliar) on production in *Lolium perenne* L.

MATERIAL AND METHOD

Research was carried out during 2013-2014, at the Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara, with experiments made in vegetation plates (Fig 1; Fig. 2). The experiment consisted in the following variants:

V1 – control variant;

V2 – complex conventional fertilisers (16:16:16), 300 kg/ha applied annually (early spring);

V3 – foliar fertiliser (Cropmax 0.2%), 0.5 l/ha applied annually after the first mow;

V4 – nutrient controlled-release filmed fertiliser (New grass), 300 kg/ha applied annually (early spring);

V5 – foliar fertiliser (Cropmax 0.2%) (applied after the second mow) + New grass 300 kg/ha (applied annually, early spring).

The foliar fertiliser (Cropmax 0.2%) was applied twice after the second mow at an interval of two weeks when the foliar area was complete. The filmed fertiliser New grass (20:20:8) has a controlled action and nutrients are released to feed the plants during three months ensuring a healthy, vigorous, evenly developed, and compact crop.

The seeds were sowed in vegetation plates in the spring of the year 2013, in March, with three replicas per variant, using the perennial ryegrass cultivar Timiș-81 (*Lolium perenne* L.) results were quantified as green matter and dry matter every production year.

Fig. 1 Aspects from the research in vegetation plates.

Fig. 2 Aspects from the research

RESULTS AND DISCUSSION

Green matter and dry matter measurements were done every vegetation year in each of the four annual mows; in comparing the data, we used total annual productions.

Table 1

Effect of foliar fertilisation on green matter production in *Lolium perenne* L. (comparison with control variant)

Variant	2013			2014		
	g/vase	difference g/vase	%	g/vase	difference g/vase	%
V_1	252	-	100	264	-	100
V_2	356	104	141.2	278	14	105.3
V_3	289	37	114.6	289	25	109.4
V_4	440	188	174.6	346	82	131.0
V_5	427	175	169.4	282	18	106.8

V1 – control variant;V2 – complex conventional fertilisers (16:16:16), 300 kg/ha applied annually (early spring);V3 – foliar fertiliser (Cropmax 0.2%), 0.5 l/ha applied annually after the first mow;V4 – nutrient controlled-release filmed fertiliser (New grass), 300 kg/ha applied annually (early spring);V5 – foliar fertiliser (Cropmax 0.2%) (applied after the second mow) + New grass 300 kg/ha (applied annually, early spring).

Table 2

Effect of foliar fertilisation on dry matter production in *Lolium perenne* L. (comparison with control variant)

Variant	2013			2014		
	g/vase	difference g/vase	%	g/vas	difference g/vase	%
V_1	55	-	100	96	-	100
V_2	74	19	134.5	98	2	102.0
V_3	61	6	110.9	100	4	104.1
V_4	92	37	16	121	25	126.0
V_5	96	41	7.2	109	13	113.5
			174.5			

V1 – control variant;V2 – complex conventional fertilisers (16:16:16), 300 kg/ha applied annually (early spring);V3 – foliar fertiliser (Cropmax 0.2%), 0.5 l/ha applied annually after the first mow;V4 – nutrient controlled-release filmed fertiliser (New grass), 300 kg/ha applied annually (early spring);V5 – foliar fertiliser (Cropmax 0.2%) (applied after the second mow) + New grass 300 kg/ha (applied annually, early spring).

Tables 1 and 2 show the production results of the variants fertilised with different types of fertilisers compared to control variants. Thus, green matter production reached a maximum level in the variant V4 (New grass) fertilised with a nutrient controlled-release complex fertiliser, i.e. 74.6% more than the control variant V1 in the first vegetation year (2013) and 31%.0% more in the second vegetation year (2014). In the variant fertilised with foliar fertiliser (V3 – Cropmax 0.2%), the increase in yield was 14.6% in the first vegetation year and 9.4% in the second vegetation year. Complex conventional fertiliser (variant V2) reached an increase in yield of 41.2% in the first vegetation year and 5.3% in the second vegetation year (Table 1).

The differences in yield between experimental variants keep almost constant in both dry matter and green matter production (Table 2). Measurements show that applying a controlled-release fertiliser such as

New grass increased with 67.2% in the first vegetation year and with 26.0% in the second vegetation year.

Table 3

Effect of foliar fertilisation on green matter production in *Lolium perenne* L. (comparison with complex fertiliser-treated variant)

Variant	2013			2014		
	g/vase	difference g/vase	%	g/vase	difference g/vase	%
V_1	252	-104	70.7	264	-14	94.4
V_2	356	-	100	278	-	100
V_3	289	-63	81.1	289	11	109.4
V_4	440	84	123.5	346	68	131.0
V_5	427	71	119.9	282	4	101.4

V1 – control variant;V2 – complex conventional fertilisers (16:16:16), 300 kg/ha applied annually (early spring);V3 – foliar fertiliser (Cropmax 0.2%), 0.5 l/ha applied annually after the first mow;V4 – nutrient controlled-release filmed fertiliser (New grass), 300 kg/ha applied annually (early spring);V5 – foliar fertiliser (Cropmax 0.2%) (applied after the second mow) + New grass 300 kg/ha (applied annually, early spring).

Table 4

Effect of foliar fertilisation on dry matter production in *Lolium perenne* L. (comparison with complex fertiliser-treated variant)

Variant	2013			2014		
	g/vase	difference g/vase	%	g/vase	difference g/vase	%
V_1	55	-19	74.3	96	-2	97.7
V_2	74	-	100	98	-	100
V_3	61	-13	82.4	100	2	102.0
V_4	92	-18	124.3	121	23	123.4
V_5	96	-22	129.7	109	11	111.2

V1 – control variant;V2 – complex conventional fertilisers (16:16:16), 300 kg/ha applied annually (early spring);V3 – foliar fertiliser (Cropmax 0.2%), 0.5 l/ha applied annually after the first mow;V4 – nutrient controlled-release filmed fertiliser (New grass), 300 kg/ha applied annually (early spring);V5 – foliar fertiliser (Cropmax 0.2%) (applied after the second mow) + New grass 300 kg/ha (applied annually, early spring).

Production results were also compared with the variant fertilised with complex conventional fertilisers (V2). From this point of view, as far as green matter production is concerned, in the variant fertilised with such controlled-release fertilisers as New grass, the increase in yield was 23.5% higher in the first vegetation year and 31.0% in the second vegetation year. Foliar fertilisation produced an increase in yield of 9.4% only in the second vegetation year (Table 3).

As for the production of dry matter, compared to the variant fertilised conventionally (V2), the maximum increase in yield of 24.3% in the first vegetation year and 23.4% in the second vegetation year was again in the variant fertilised with New grass (Table 4).

CONCLUSIONS

Studies carried out pointed out that applying complex controlled-release and long-lasting effect fertilisers has a much higher influence on the production of green matter than the other types of fertilisers. Under research-specific conditions (vegetation vases), the increases in yield compared to the control variant ranged between 26 and 75% depending on vegetation year.

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